

TRICKS FOR ENSILING FORAGE SORGHUMS

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Many forage sorghum crops were successfully grown and harvested as silage and hay last season to bolster feed shortages during the drought and it will probably be the same this season.

Sorghum is an ideal crop to grow in areas of high temperature, where irrigation is limited or unavailable, and in dryland areas where rainfall is too unreliable to grow maize.

Sorghum uses water (and nitrogen fertiliser) very efficiently for a summer growing crop. The main categories of sorghum available are:

1. Multicut: hybrid forage sorghums, eg sorghum x sudan grasses and sudan grass hybrids; and
2. Single cut: such as sweet and grain sorghums.

There are a few down sides to ensiling forage sorghums. They have lower nutritive values than maize or grain sorghum, they accumulate nitrates in certain environmental stress conditions, and they can cause prussic acid poisoning in early growth or regrowth situations.

The agronomy of forage sorghums and its grazing management up to harvesting cannot be covered in this article, and are adequately covered in the respective Department of Primary Industries website www.dpi.vic.gov.au (go to Agnotes) or from seed company representatives or their distributors and retailers.

Forage sorghums can vary widely in nutritive value, due mainly to the stage of maturity at cutting (See Table 1). Weather conditions and dry matter content (DM %) at harvesting, cultivar selection, fermentation quality, effectiveness of storage, efficiency at feeding out, etc will also affect its nutritive value (and DM losses).

Despite the wide range of values shown in Table 1, maize will generally produce silage with reasonably consistent nutritive values, unless it experiences extreme weather conditions at harvest.

Forage sorghum types that can be ensiled are forage sorghum hybrids, sweet and grain sorghums, the older forage sorghum varieties, sudan grass hybrids, and sorghum-sudan grass hybrids.

The types best suited for ensiling are the forage and sweet and grain sorghums, whilst the others are more suited for hay production or grazing than silage. Some varieties have now been bred to contain a brown mid rib character, resulting in plants with less lignin and slightly higher nutritive value although yields are slightly lower.

Table 1. Nutritive characteristics of maize and forage sorghum as fresh cut, silage and hay

Crop type		Crude Protein (%)	Metabolisable Energy (ME)	Neutral Detergent Fibre (%)
Forage sorghum	Fresh Cut (Range)	12.1 (5.6 – 27.0)	9.4 (7.0 – 11.7)	56.5 (37.6 – 71.7)
	Silage (Range)	10.0 (5.2 – 16.1)	9.0 (6.3 – 11.0)	62.4 (49.7 – 73.0)

	Hay (Range)	10.4 (2.7 – 18.4)	8.7 (6.1 – 10.7)	62.1 (42.9 – 74.8)
Maize	Silage (Range)	7.4 (4.8 – 9.9)	10.4 (6.5 - 12.9)	45.5 (23.0 – 75.3)

Source: FEEDTEST 2007

When to cut for quality silage

Multicut forage sorghums should be harvested early before its energy content decreases too far. The height of cut for optimum nutritive value and yield is approximately 1m high.

Unfortunately the dry matter content of the standing crop will be far too low (13 – 16 % DM) at this stage and must be wilted to above 30 percent DM to avoid a poor fermentation. A poor fermentation will result in high losses and silage of low palatability, ie the cattle won't like it.

The higher quality silages in Table 1 will have been cut near 1m height, wilted quickly to 30 to 40 percent DM before being chopped very finely into a well-compacted and well-sealed stack. Unfortunately, bigger is not always better and the bottom end of the ranges in Table 1 is often the result of sorghums cut way too late, despite the high yields.

Forage sorghums, particularly the finer stemmed varieties, can be baled but ideally, a chopper baler should be used to allow greater compaction in the bale.

The bales should be net-wrapped to help prevent protruding stalks puncturing the plastic wrap. Aim for 35 – 45 percent DM and do not drop the wrapped bales onto the stubble! Consider using six layers of plastic for added strength for transportation. This may also allow a longer storage period.

A mower-conditioner or super conditioner will be essential to crush the stems to even out the drying somewhat between stems and leaves, the most nutritious part of the plant. Leave the swath as wide as possible to encourage moisture loss. Avoid picking up soil with rake or pick-up tynes as soil borne bacteria will adversely affect fermentation. The cut crop should be in the pit or bale within one or two days, if possible.

Single cut sweet sorghums have very juicy stems that contain high levels of water-soluble carbohydrates (sugars) and variable grain content. They can yield at similar levels to maize and withstand a wider range of growing conditions but their nutritive values are slightly lower, and can be much lower in some situations. Unlike hybrid forage sorghums and maize, the high sugar content allows sweet sorghums to remain relatively stable in terms of DM yield and nutritive value over an extended period, allowing a wide harvest window.

A standing crop of sweet sorghum will be about 25 to 30 percent DM, but its high sugar content ensures that it will ensile easily without wilting. It can be harvested between the boot/head emergence through to the late dough stage, even later without too much drop in quality. However a precision chopper is essential for harvesting.

Single cut grain sorghums are tall growing hybrids and dual purpose (graze + grain or silage + grain) sorghums that can produce high yields with nutritive value slightly below that of maize. It is best harvested when the grain in the middle of the head is at the soft dough (Brie cheese) stage off maturity and before the leaves start to die off.

The crop will be approximately 30 to 35 percent DM at this stage. Crop yield potential is reduced if below 30 percent DM, and is difficult to compact if above 35 percent DM. Grain processing during harvesting will improve its digestibility substantially.

Animal health issues

In any ration for livestock, be aware of the potential for very low crude protein and high fibre contents (Table 1) in all the forage sorghums.

Many sorghum crops also contain low levels of sodium (Na) so they may need extra sodium (salt) supplied if feeding levels of sorghum are substantial, depending on the other parts of the ration. Sulphur (S) can also be a problem when feeding sorghum, not because it is deficient in the plant, but because it becomes deficient in the diet as the S is used to detoxify hydrogen cyanide (HCN) when sorghums are eaten.

Sorghums can accumulate HCN that then converts to prussic acid when the plant is under stress. The risk of prussic acid poisoning is highest in young plants or stunted and plants stressed from such impacts as drought, frost, flood, and foliar herbicides such as 2, 4-D. Ensiling may reduce this risk by approximately 50 %, but occurs mainly due to release of prussic acid to the atmosphere as a result of conditioning, wilting fine chopping etc. This is not the case in hay making so HCN levels will tend to remain high.

Stressed sorghum crops, cloudy conditions and an inadequate period between applying high rates of nitrogen and harvest can lead to nitrate poisoning. Ensiling will greatly reduce (~ 50 percent) this, but not hay making.